

Standard Operating Procedure

09 - READING BASED PM



A. Purpose

Condition based preventive maintenance often falls within *two* categories **Readings** and **Usage**. SOP-09 illustrates the first example of a Condition Based PM identified through **Readings**. When readings are captured through the normal PM work order closing process, a Condition Based PM work order will be generated when a specified Reading falls outside the normal operating range.

The second common example of a Condition Based PM is Usage, i.e. mileage, or hours (See SOP-10 USAGE BASED PM). When a piece of equipment accumulates the specified number of miles or hours, a Usage PM work order is generated.

B. Responsibilities

➤ Maintenance Manager

The Maintenance Manager is responsible for determining the scope, interval, generation and creation of Preventive Maintenance procedures.

➤ Customer Service / Technician

Customer Service / Technician is responsible for closing preventive maintenance work orders. The Technician is also responsible for performing the assigned task(s) and making recommended adjustments to procedures as necessary.

C. Process Overview

Maintenance Manager / Customer Service / Technician

Step 1: Create a Condition based PM.

Step 2: Associate this Condition Based PM with a specific piece of equipment.

Step 3: Schedule Equipment PMs.

Step 4: Print PM Work Orders:

- Distribute PM Work Orders to Technicians
- Technicians Perform PM Tasks
- Technicians turn-in Completed Work Orders

Step 5: Close completed PM work orders.

Note: In the event that a designated Equipment Reading is outside of the acceptable specification limits, a Caution window will “pop-up”. *If this happens, repeat Steps 3 - 5 until the problem is rectified.*

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D. Process Steps

READINGS

PREVENTIVE MAINTENANCE FORM

Step 1: Create a Condition Based PM

To establish a Condition Based PM through Readings, *i.e. AMPS*, follow the steps outlined below:

- **Create a Condition Based PM** for a particular type of equipment, *i.e. Boilers*.

Fill in the standard Preventive Maintenance fields and Billing as per usual with the exception of the following:

- This Reading based PM is **never** superseded.
- **Tab** to the **Frequency** field and **select** a “**Blank**” value
- **Tab** to the Frequency **Number** field and **leave** it “**Blank**”.
- **Tab** to the **Task List** and **type** in **PM tasks**.
- **Click** on the **Readings** button.

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READINGS

PREVENTIVE MAINTENANCE FORM – READINGS BUTTON

Readings To Be Taken:

Specification Type	Enter Date	Enter User

- **Select the Specification Type AMPS** from the list of values (*right click or F9*).

Spec_Type
ABOVE
ACRE
AMPS
BEARING
BEARING_SZ
BELT
BHP
BOIL
BTU
CAP

- **Click OK**

Result: *The AMPS Specification Type is now loaded. It also identifies the date and User the Specification was entered by.*

Specification Type	Enter Date	Enter User
AMPS	FRI SEP 19, 2003	CAMISCOOR

- **Click on the X** to return to the Preventive Maintenance Form.

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READINGS

PREVENTIVE MAINTENANCE FORM – LABOR BUTTON

- Click on the **Labor** Button

Primary Labor Requirements			
Crew	Size	Craft	Est Hours
ELECTRICAL	1	ELECTRICIN	1.00

Secondary Labor Requirements				
Crew	Size	Craft	Est Hours	Task List

- Select the **Crew**, i.e. **ELECTRICAL** from the list of values (**right click** or **F9**).
- **Tab** to the **Crew Size** and **type** the **number** required, i.e. **1**
- **Tab** to the **Craft** and **select Electrician** from the list of values (**right click** or **F9**).
- **Tab** to the **Est Hours** field and **type** in the **number** of hours, i.e. **1.00**
- Click **OK**

Result: *This will now bring you back to the Preventive Maintenance form.*

Note: *Now that the Condition Based Preventive Maintenance procedure for AMPS is established, you now need to associate this PM procedure with a specific piece of equipment.*

To associate this Condition Based PM with a specific piece of equipment:

- Close the **Preventive Maintenance** form
- Go to the **Equipment** form

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READINGS

EQUIPMENT FORM

Step 2: Associate a Condition Based PM with a specific piece of equipment

- **Locate** the **equipment** you wish to establish the Readings for, *i.e. Equipment ID Number 0000009852*

The screenshot shows the 'Equipment' form in the CAMIS system. The form is divided into several sections:

- Equipment:** ID 0000009852, Name BOILER, Parent 268BSB9000MECH, Category EQUIPMENT \ MECH \ HVAC \ BOILERS.
- Manufacturer:** Mfr No. RAYPACK, Mfr Part No. NATURAL GAS, Model W1-0750, Serial No. 9908161914.
- Location:** Site BSB05, Building 268BSB9000, Floor 01, Room 101, Zone.
- Description:** Keyword BOILERS, Type HVAC, Asset No. 268B19BSB9000, Equip Group MECH, PM Group, Criticality.
- General Information:** Assessment Date TUE JAN 2, 2001, Service Guide, Status / Condition ACTIVE / GOOD, Rental Type, Rental / Mileage Rate, Replacement Cost 115710.00, Overall Rating 2016.

Buttons on the right include Billing..., WO History..., Details..., Dates..., Audit..., and Attributes...

- **Click** on the **Specifications** Tab.

Result: This will bring you to the Specifications for this piece of equipment.

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READINGS

EQUIPMENT FORM – SPECIFICATIONS TAB

Note: *Ensure the Specification Type, i.e. AMPS, is listed in the Specification Type table below. If it is not, insert it into this Specification Type table.*

Specification Type	Cond Type	U/M	Lower Limit	Nominal	Upper Limit	Display Order
AMPS	AMPS	EA	100	150	200	1
BHP						
BTU						
COST						
DUTY						
FUEL_TYPE						
MBH						
NUMBER						

From the **Specification Type AMPS**:

- **Tab** to the **Condition Type** field and **select** AMPS from the list of values
- **Tab** to the **U/M** field and **select** EACH from the list of values
- **Tab** to the **Lower Limit** field and **type** in the **minimum tolerance, i.e. 100**
- **Tab** to the **Nominal** field and **type** in the **Standard (expected) reading, i.e. 150**
- **Tab** to the **Upper Limit** field and **type** in the **maximum tolerance, i.e. 200**
- **Tab** to the **Display Order** field and **type** in the **rank** to display the specification, **i.e. 1 for first**
- **Click** on the **PMs** Tab

Result: This will bring you to the Preventive Maintenance procedures for this piece of equipment

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READINGS

EQUIPMENT FORM – PMs TAB

To insert the newly created Condition Based PM Reading:

- **Go to** a blank **PM Number** field
- **Right click** and **select List of Values** or **F9** in the **PM Number** field

Result: **The Preventive Maintenance List Form appears**

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READINGS

EQUIPMENT FORM – PMs TAB

PREVENTIVE MAINTENANCE LIST FORM

PM Number	Description	Category	Type
	%CONDITION%		

Locate the **Condition Based PM** created by:

- **Tab** to the **Description** field and **type** ‘%CONDITION%’
- **Click** on the **Green Traffic Light** or **press F8**
- **Select** appropriate **PM**

PM Number	Description	Category	Type
P000000910	BOILER - CHECK ELECTRICAL CONDITION	BOILERS	CORP

- **Click OK**

Result: *The Condition PM information is now populated.*

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READINGS

EQUIPMENT FORM – PMs TAB

Result: *The Condition PM Number is now linked to this piece of equipment.*

PM Number	Description	Next PM	Actual Travel Date	Time
PM000029	YEARLY - BOILERS PREVENTIVE MAINT		<input checked="" type="checkbox"/>	<input type="checkbox"/>
PM000030	MONTHLY - BOILERS PREVENTIVE MAINT		<input checked="" type="checkbox"/>	<input type="checkbox"/>
P000000310	BOILER - CHECK ELECTRICAL CONDITION		<input checked="" type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>

Note: *Condition PMs are not time based – the Next PM date field must be left blank.*

➤ **Click on the Criteria Button**

Condition Type	UM	Pr	Below	Above

Result: *The Criteria form is now displayed for this PM.*

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READINGS

EQUIPMENT FORM – PMs TAB

Ensure the following:

Time-Based:

- **Override** field is *Blank*
- **Last Completion** Date field is *selected*

Usage-Based:

- **All** fields are *blank* and **Est. Interval** is *None*

Condition Based:

- **Select** AMPS by *right click* or **F9** (L.O.V.)
- **Tab** to **Priority** field and *type* in the **priority**, *i.e. 1*
- **Tab** to the **Below** field and *type* in the **minimum** acceptable range, *i.e. 100*.
- **Tab** to the **Above** field and *type* in the **maximum** acceptable range, *i.e. 200*.

Season:

- *Leave* this area **blank**
- *Click* **OK**

Result: *The Readings Based PM is now active.*

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READINGS

EQUIPMENT FORM – PMs TAB

Note: *A Reading Based PM will generate when the following two conditions are met:*

- *A reading outside of the normal operating range is entered during a work order closing, and*
- *When equipment PMs are scheduled.*

For reading based PM's to be effective it is critical to schedule Equipment PMs immediately following the work order closing when ever an established limit has been exceeded.

SEE THE EXAMPLE OF A READING BASED PM THROUGH READINGS ON PAGES 12 - 18.

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READINGS

SCHEDULE EQUIPMENT PMs

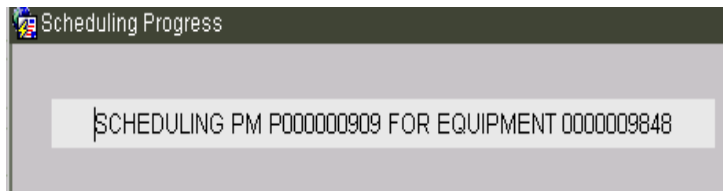
Step 3: Schedule Equipment PMs.

Go to the Schedule Equipment PMs form.

A screenshot of the "Equipment PM Scheduling" window. The window has a title bar with the text "Equipment PM Scheduling" and standard window controls. Inside, there is a "Scheduling Criteria" section with a "Schedule Up Through Week:" label and a date field containing "MON OCT 6, 2003". Below this are three labels: "Site (Blank For All):", "Crew (Blank For All):", and "Priority Codes At Least:", each followed by a text input field and a dropdown arrow. To the right of the criteria section are two buttons: "Schedule" and "Error Report".

➤ Click on the Schedule Button

Result: The Equipment PM will schedule.



Note: *(This may take a few minutes.)*

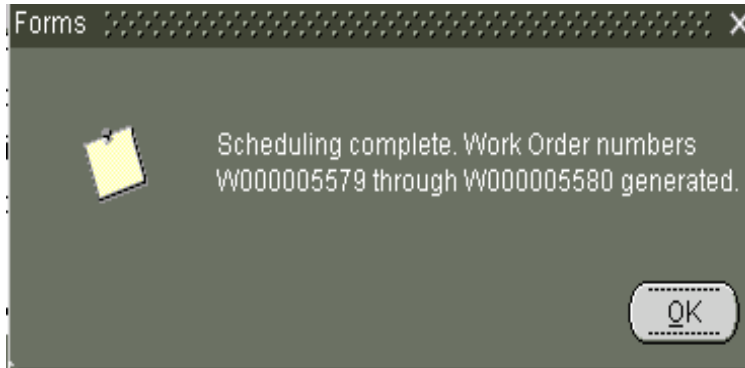
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READINGS

SCHEDULE EQUIPMENT PMs



- **Click OK** after Scheduling is complete.
- **Click** on the **X** to close the Equipment PM Scheduling form.

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READINGS

PRINTING / DISTRIBUTING PM WORK ORDERS

Report – Work Order Ticket

Step 4: Print PM Work Orders

- **Distribute PM Work Orders to Technicians**
- **Technicians Perform PM Tasks**
- **Technicians turn-in Completed Work Orders**

The Batch Work Order function can be found from the Main Menu (Navigator).

Go to the Main Menu (Navigator)

- *Open* the **Work Orders** folder
- *Open* the **Reports – Work Order Tickets** folder
- *Open* the **Report – Work Order Ticket**

Sign onto the **Database User Authentication** Screen:

- *Click* on the **Submit Query** button

Result: This will invoke Adobe Acrobat Reader

Go to File Menu and Select the Print Option or *click* on the **Printer** button

- *Click* **OK**

Result: The PM Work Orders will be sent to the printer.

At this time:

- **Distribute PM Work Orders to Technicians**
- **Technicians Perform PM Tasks**
- **Technicians turn-in Completed Work Orders**

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READINGS

CLOSING EQUIPMENT PMs

Step 5: Close completed PM work Orders

Go to the Current Schedule form.

- *Select the Work Order to be closed.*

- *Click on the Close WO button.*

Result: *The Work Order Closing Form appears.*

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READINGS

CLOSING EQUIPMENT PMs

To close this Work Order:

- **Change** the **Status** from OPEN to **CLOSED**
- **Fill in** appropriate **dates**

From the completed Work Order Ticket (ex. Page 18) –

Verify and update appropriate fields in the following Tabs:

- **Task List**
- **Crews**
- **Labor**
- **Material**

Go to the **Readings** Tab:

	Condition Type	Date Taken	UM	As Found	As Left	Recommended Values		
						Lower Limit	Nominal	Upper Limit
<input checked="" type="checkbox"/>	AMPS	MON SEP 29, 2003	EA	99	98	100	150	200
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								

- **Select** the **Condition Type**, *i.e. AMPS*
- **Tab** to the **Date Taken** field, *type* in appropriate **date**
- **Tab** to the **As Found** field, *type* in **value found**, *i.e. 99 amps*.
- **Tab** to the **As Left** field, *type* in **value left**, *i.e. 98 amps*.

Note: *The As left (98 amps) is outside the normal operating tolerance (100 – 200 amps).*

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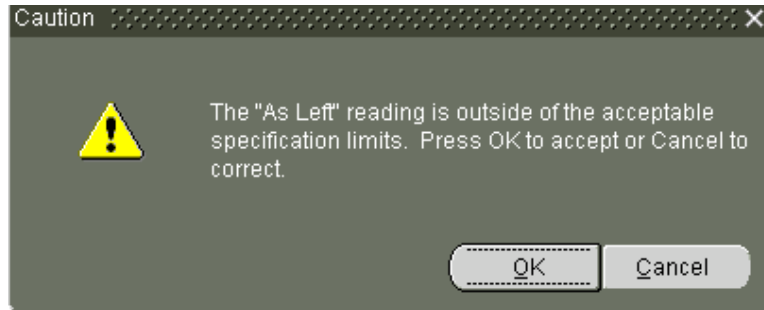
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READINGS

CLOSING EQUIPMENT PMs

Result: The following Caution pop-up window appears:



➤ **Click OK**

Note: *At this time, it is critical to correct the deficient reading and to run through Schedule Equipment PMs on pages 12-18.*

Immediate Action Steps Outlined:

- **Schedule Equipment PMs**
- **Locate** deficient **Reading PM Work Order** on the **Current Schedule**
- **Print** the deficient **Reading PM Work Order**, (*See Step 4 on page 14*)
- **Dispatch** crew or technician
- **Correct the deficient Reading** within **acceptable limits**, i.e. **100-200 amps** by **updating** the appropriate **Readings**.
- **Close Work Order** via the **Work Order Closing Form**.

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READINGS

CLOSING EQUIPMENT PMs

=====

WORK ORDER TICKET

=====

WO Number: W000005561

Description: BOILER - CHECK ELECTRICAL CONDITION

Enter User: JREARDON Schedule Date: 29-SEP-2003

Type: CORRECTIVE Due Date:

Status: OPEN Modify Date:

Priority: 1 Start Date:

Method: IN HOUSE Nonavailable Time:

Crew: ELECTRICAL Req Type: PM

Craft: ELECTRICIAN Req Number: F000000910

Assigned To: JREARDON REARDON, JOHN Requestor:

Est Hours: 1 Telephone:

Site: BSB05 Mail Code:

Building: 268BSB9000 Department:

Bldg Desc: OFFICE BUILDING #2 CP Number:

Floor: 01 Equipment: 0000009852

Room: 101 Nomenclature: BOILER

Task List

CORRECT CONDITION IMMEDIATELY

Cond Type	Um	Spec Number	Lower Limit	Upper Limit	As Found	As Left
AMPS	EA	150	100	200		

➤ **Technician** will fill out the **As Found** and **As Left** condition for **AMPS**.

Note: This Condition PM Work Order displays Lower and Upper Limits for this piece of equipment.